

Advancing Digitization of Biodiversity Collections (ADBC)

PROGRAM SOLICITATION

NSF 15-576

REPLACES DOCUMENT(S):

NSF 13-569



National Science Foundation

Directorate for Biological
Sciences
Division of Biological
Infrastructure

Directorate for Geosciences
Division of Earth Sciences

Full Proposal Deadline(s) (due by 5 p.m. proposer's local time):

October 09, 2015

Second Friday in October, Annually Thereafter

IMPORTANT INFORMATION AND REVISION NOTES

The program is moving from Emerging Frontiers to the Division of Biological Infrastructure for management. Changes have been made throughout the document to indicate this change.

Expected integration of the projects into the activities of the National Resource (iDigBio) is clarified in several places to emphasize how to address this expectation. Also language on the annual PI meeting is now included in the solicitation.

Language has been clarified in the solicitation regarding integration of other data from institutions or sources not being directly funded by the project.

Important Information

Any proposal submitted in response to this solicitation should be submitted in accordance with the revised NSF Proposal & Award Policies & Procedures Guide (PAPPG) (NSF 15-1), which is effective for proposals submitted, or due, on or after December 26, 2014. The PAPPG is consistent with, and, implements the new Uniform Administrative Requirements, Cost Principles, and Audit Requirements for Federal Awards (Uniform Guidance) (2 CFR § 200).

SUMMARY OF PROGRAM REQUIREMENTS

General Information

Program Title:

Advancing Digitization of Biodiversity Collections (ADBC)

Synopsis of Program:

This program seeks to enhance and expand the national resource of digital data documenting existing vouchered biological and paleontological collections and to advance scientific knowledge by improving access to digitized information (including images) residing in vouchered scientific collections across the United States. The information associated with various collections of organisms, such as geographic, paleogeographic and stratigraphic distribution, environmental habitat data, phenology, information about associated organisms, collector field notes, and tissues and molecular data extracted from the specimens, is a rich resource providing the baseline from which to further biodiversity research and provide critical information about existing gaps in our knowledge of life on earth. The national resource is structured at three levels: a central coordinating organization, a series of thematic networks based on an important research theme, and the physical collections. The national resource builds upon a sizable existing national investment in curation of the physical objects in scientific collections and contributes vitally to scientific research and technology interests in the United States. It will become an invaluable tool in understanding contemporary biological issues and challenges.

Cognizant Program Officer(s):

Please note that the following information is current at the time of publishing. See program website for any updates to the points of contact.

- Anne M. Maglia, Program Director, telephone: (703) 292-8470, email: biodigit@nsf.gov
- H. Richard Lane, Program Director, telephone: 703-292-4730, email: biodigit@nsf.gov

- Roland P. Roberts, telephone: (703) 292-8470, email: biodigit@nsf.gov

Applicable Catalog of Federal Domestic Assistance (CFDA) Number(s):

- 47.050 --- Geosciences
- 47.074 --- Biological Sciences

Award Information

Anticipated Type of Award: Standard Grant or Continuing Grant

Estimated Number of Awards: 4 to 12

Anticipated Funding Amount: \$10,000,000

Total amount available across all awards in this program for FY2016, pending availability of funds.

Eligibility Information

Who May Submit Proposals:

Proposals may only be submitted by the following:

- Universities and Colleges - Universities and two- and four-year colleges (including community colleges) accredited in, and having a campus located in, the US acting on behalf of their faculty members. Such organizations also are referred to as academic institutions.
- Non-profit, non-academic organizations: Independent museums, observatories, research labs, professional societies and similar organizations in the U.S. associated with educational or research activities.
- State and Local Governments: State educational offices or organizations and local school districts

Who May Serve as PI:

There are no restrictions or limits.

Limit on Number of Proposals per Organization: 1

Only one Thematic Collections Networks (TCN) proposal may be submitted by any one organization as the lead organization. Organizations may be involved in more than one collaborative effort as a non-lead proposal.

Limit on Number of Proposals per PI or Co-PI: 1

An individual may appear as PI or co-PI on no more than one ADBC proposal submitted to any annual ADBC competition.

Proposal Preparation and Submission Instructions

A. Proposal Preparation Instructions

- **Letters of Intent:** Not required
- **Preliminary Proposal Submission:** Not required
- **Full Proposals:**
 - Full Proposals submitted via FastLane: NSF Proposal and Award Policies and Procedures Guide, Part I: Grant Proposal Guide (GPG) Guidelines apply. The complete text of the GPG is available electronically on the NSF website at: http://www.nsf.gov/publications/pub_summ.jsp?ods_key=gpg.
 - Full Proposals submitted via Grants.gov: NSF Grants.gov Application Guide: A Guide for the Preparation and Submission of NSF Applications via Grants.gov Guidelines apply (Note: The NSF Grants.gov Application Guide is available on the Grants.gov website and on the NSF website at: http://www.nsf.gov/publications/pub_summ.jsp?ods_key=grantsgovguide)

B. Budgetary Information

- **Cost Sharing Requirements:** Inclusion of voluntary committed cost sharing is prohibited.
- **Indirect Cost (F&A) Limitations:** Not Applicable
- **Other Budgetary Limitations:** Other budgetary limitations apply. Please see the full text of this solicitation for further information.

C. Due Dates

- **Full Proposal Deadline(s)** (due by 5 p.m. proposer's local time):

October 09, 2015

Second Friday in October, Annually Thereafter

Proposal Review Information Criteria

Merit Review Criteria: National Science Board approved criteria. Additional merit review considerations apply. Please see the full text of this solicitation for further information.

Award Administration Information

Award Conditions: Standard NSF award conditions apply.

Reporting Requirements: Additional reporting requirements apply. Please see the full text of this solicitation for further information.

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I. INTRODUCTION

An estimated 1.8 million named species of organisms exist on Earth today and many more are now extinct. This rich diversity is documented through research collections of fossil and extant organisms housed in natural history museums, universities, field facilities, botanical gardens, state surveys, and other institutions maintaining collection facilities. These vouchered collections provide validation for species names and identifications along with a wealth of ancillary data such as DNA sequences, field notes, stratigraphic position, environment/habitat information, time of collection, audio recordings, and the condition of the specimen at the time of collection. Paleontological collections provide time of existence, evolutionary history, proxy data, and past distribution information in space and time.

Collections data reveal gaps in our knowledge of biodiversity and provide the baseline from which to continue biodiversity studies. Filling these gaps is crucial to a complete understanding of the biodiversity of the planet, both in space and time. Specimens and their associated data allow us to reconstruct the history of climate and tectonic plate changes as reflected in a validated record of life on earth. Having this baseline information allows efficiency of effort in biodiversity exploration. Gaps in specimen collections and associated natural history data can be used to strategically target further research and field exploration. The effort to digitize, image, and provide online accessibility to these data is critical for understanding biological knowledge in space and time, and underpins how we address contemporary scientific and societal issues, including planetary biogeography and climate change.

Knowledge of the planet's biodiversity documented in vouchered scientific collections represents an area of exploration and discovery carried out over the entire course of scientific history, yet the extent of life on earth is still not known definitively. New efforts and approaches to understanding biodiversity and advancing our knowledge are represented by several NSF programs (e.g., Dimensions of Biodiversity, Systematics and Biodiversity Science, Sedimentary Geology and Paleobiology). However, there is a digitization bottleneck that effectively limits access to information residing in the various existing vouchered collections across the U.S. and the world. It is estimated that U.S. collections contain one billion specimens, but only 10% of these are accessible online. As a consequence, the critical information in the physical collections is underutilized, the usefulness of scientific collections data in research remains limited, and the importance of the collections is not appreciated.

The Interagency Working Group on Scientific Collections developed a comprehensive report on the current status of federally owned collections (<http://nscalliance.org/wordpress/wp-content/uploads/2009/11/iwgsc-report.pdf>), and NSF, as part of that working group, surveyed federally supported collections (http://www.nsf.gov/bio/pubs/reports/prelim_findings_sc_2008.pdf) and a summary of the findings at <http://www.nsf.gov/pubs/2009/nsf09044/nsf09044.pdf>). Both reports emphasized the importance of leveraging past investments by digitizing collections and making them available and searchable online to researchers worldwide.

Responding to concerns expressed in these reports, members of the biological and paleontological collections community developed a ten-year strategic plan to digitize, image and mobilize biodiversity collections data (http://digbiocol.files.wordpress.com/2010/08/niba_brochure.pdf) and followed this strategy with an implementation plan for accomplishing the goal that depends upon a number of stakeholder activities (<http://www.aibs.org/public-policy/biocollections.html>).

The goal of the digitization effort is "to produce a resource of lasting value for answering major research questions." The plan stated the following key objectives: "digitize data from all U.S. biological collections, large and small, and integrate these in a web accessible interface using shared standards and formats, develop new web interfaces, visualization and analysis tools, data mining, georeferencing processes and make all available for using and improving the collections resource, create real-time upgrades of biological data and prevent the future occurrence of non-accessible collection data through the use of tools, training, and infrastructure." This solicitation is a response to the community's call for action and provides seed funds to begin the process. It is not

designed to address all the items within the strategic and implementation plans.

II. PROGRAM DESCRIPTION

Digitizing and mobilizing the Nation's biological and paleontological collections represents a grand challenge and will require development of both technical and human resources to support the creation of an enduring digital alliance of collections and institutions. In 2011 Integrated Digitized Biocollections (iDigBio) at the University of Florida was established as a national resource to integrate all resulting data and make them widely accessible. In addition, iDigBio provides training opportunities, disseminates best practices and workflows, hosts workshops, virtual meetings and integrates education and outreach activities from the Thematic Networks. Collections digitization is defined broadly for the purpose of this solicitation to include the capture of digital images of specimens, transcription into electronic format of various types of data associated with specimens, linking ancillary data already stored in an electronic format apart from the voucher specimens, the georeferencing of specimen-collection localities, and mobilization of all the data together online. In all cases the primary focus of the digitization effort should be the **physical specimens** owned by the collection. Ancillary material may be included as appropriate through links to the specimens. Paleontological collections are included and may be integrated with biological collections if relevant to a research theme, or may be digitized around a research theme unique to the past. This program will create an organizational structure and processes inclusive of the broad biological and paleontological collections community, provide open data access, and empower biological and paleobiological researchers.

Proposals that address the goals of specimen digitization through innovative plans, strong collaborations among large and small institutions, and mechanisms to build upon existing digitization projects are strongly encouraged. Proposals that increase efficiency and numbers of specimens digitized will have a stronger priority for funding (e.g. by reducing the time and cost per specimen, or by developing new workflows). Current practices cannot achieve a goal of digitizing the existing collections within a ten year period and if this goal of the community strategic plan is to be achieved, there must be new approaches applied to the effort.

The Directorate for Geosciences under the EarthCube vision seeks to support community driven efforts in cyberinfrastructure to integrate data and information for knowledge management. See <http://www.nsf.gov/geo/earthcube/index.jsp> and <http://earthcube.org> for further information on this activity. Paleontological ADBC proposals should indicate their relevance to Earth Cube goals.

Collaboration with federally held collections is encouraged, but digitization of federally held and owned collections cannot be supported with NSF funds. However, specimens owned by federal institutions may be pertinent for a research theme and in those cases integration of the existing data from all specimens should be considered. The federal agencies are developing guidelines for federally owned collections through the Interagency Working Group on Scientific Collections and, where partnerships are formed with Federal collections, coordination with the federal collections' data should be consistent with the standards and policies being developed by the Interagency Working Group. The proposal should articulate a plan to accomplish this integration (for example, including representatives from the federal collection as meeting participants, sharing workflows and file formats, etc.).

Research on the collections themselves, or on the research theme is not supported under this solicitation, but is supported in related programs such as Dimensions of Biodiversity, GoLife, etc. Also, supplements for research activities are not supported under this program.

Digitization of *existing* biological collections/specimens that are vouchered, curated and owned by non-Federal U.S. institutions is supported. To clarify the meaning of what specimens are supported through this program: *existing* specimens are defined under this program as specimens which have been prepared, curated, placed into organized storage units and under the ownership of the institution in which they reside. Backlogs of specimens in boxes, jars, buckets, or like containers following collection but pre-curation activities are not included. Nor are collections which are not actually owned by the institution seeking funds for digitizing. Ownership is generally determined by or located through information associated with labels, accession numbers, catalogues or other identifying items that indicate the specimen has been incorporated into the institution's property. For information about ownership of specimens collected through NSF research activities, see the GPG under the category of Tangible Property. Specimens owned by private individuals and not by an institution are not eligible for funding. It should be noted here that federal collections are being asked to account for specimens under their ownership through activities of the Office of Science and Technology Policy and the Interagency Working Group on Scientific Collections, and in situations where the institution finds specimens actually owned by federal agencies or other institutions, tagging those specimens and providing the information about them back to the agency or institution which owns the specimens is encouraged. If institutions housing these collections decide to digitize these specimens, funds external of NSF funds should be utilized for the activity.

Biomedical/medical collections are not supported. International Institutions' collections are not eligible for direct digitization funding but their value to certain research themes is recognized and partnerships for integration of data are encouraged. This solicitation does not support new collecting efforts, nor does it support collections that are not yet curated and accessioned into an eligible institution. Improvements to research collections, individual institution projects or small collaborative projects aimed at protecting specimens and providing information online are supported under the Collections in Support of Biological Research (CSBR) program.

This solicitation focuses on proposals for Thematic Collections Networks (TCN) and proposals for Partners to Existing Networks (PEN) to link with existing TCNs, outlined below. Improvements to individual collections are supported through CSBR. If an institution has an award from CSBR that includes specimens that are digitized or are being digitized and these are important for the research theme of the TCN being proposed, then that institution may be included as part of the TCN activities and their digitized data should be incorporated into the network. The PI on the CSBR project should be included as a participant in the TCN activities.

Proposals for Thematic Collections Networks (TCNs):

Thematic Collections Network (TCN) proposals will be submissions for two-to-four year awards to digitize existing specimens based on a particular research theme. This research theme may be a grand challenge for biodiversity, a part of a grand challenge, or another important research theme requiring information from existing collections. Specimens to be digitized should be of critical importance to the research theme and the criteria for the specimen assessment should be indicated in the proposal. The collaborating institutions will conduct the actual digitization of the specimens (including imaging and mobilization of the data). The length of award and size of award will depend upon the number and size of the collections to be digitized. This solicitation encourages projects of various sizes and duration, although the expectation is that all projects will be collaborative efforts among several institutions. Integration across different types of collections is expected for broad research themes, and proposals should include a description of the metadata to be used to integrate these disparate collections. Integration of disparate collections is needed to provide research support to increasingly collaborative research projects and projects which approach this problem using new methods are encouraged. TCNs will share infrastructure among the collections involved in the project, identify deliverable goals (one of which should be how the data will add significantly to future research within the overall theme of the project) and metrics for assessment, identify specific needs for community support, and reach out to other collections for inclusion in the digitization effort. TCNs may request a maximum duration of 4 years; the budget should support the scope of work proposed. Travel for PIs should include attendance at the first PI summit held by

iDigBio after the award is made. Organizational and annual meetings of the TCN personnel can be virtual through iDigBio or in person if necessary. Often adding one day of expenses to an annual meeting already attended by the collaborators in the network is an efficient and cost effective means to hold in-person meetings.

Recipients will perform fundamental collections digitization and other activities within the TCN. They are also expected to be engaged in collaboration with the National Resource for Digitization of Biological Collections: Integrated Digitized Biocollections (iDigBio) at the University of Florida in training activities, outreach, and the development of appropriate technology and standards to produce an interoperable network.

TCNs will partner with iDigBio, participate in iDigBio activities and conform to the standards and practices set through the coordinating groups of iDigBio. Education and Outreach activities should also be coordinated with iDigBio. All data from the TCNs will be made available through iDigBio in a timely manner and projects will report to iDigBio on a regular cycle. TCNs will be required to participate in the development and/or adoption of strategies, standards, and interoperability infrastructure in cooperation with iDigBio and the advisory bodies of the overall national program. TCNs will be required to interact with iDigBio to promote a community of collections, not only through integration of collections data but also through social networking tools, coordination workshops, or synthesis meetings held by iDigBio when appropriate.

Priority is given to proposals that approach the digitization problem in innovative ways, through integration of collections, application of techniques that are innovative, cost effective, and drive down the financial and personnel costs of digitization of specimens and/or speed up the process of digitization.

Proposals for Partners to Existing Networks (PENs):

Proposals to partner with and further the efforts of ongoing NSF-funded TCNs are encouraged. The new partners must increase the number of specimens digitized in the ongoing project and fill gaps not addressed by the specimens in the existing TCN. Since the existing TCNs are working to integrate data via the National Resource for Digitization of Biological Collections: Integrated Digitized Biocollections at the University of Florida (iDigBio), a list of active or sustained projects is available through the iDigBio website.

Collections seeking to digitize and integrate their data into the activities of existing TCNs may submit proposals. Any TCN which is either in progress on its NSF award or which has established itself as a sustainable entity (i.e. part of professional society activities, part of regional collaborations at the universities, or supported by funding other than NSF) is eligible for including new partners. It is expected that PEN proposals will work with the TCN to develop a budget that is compatible with these collaborative projects. PEN awards will be for 2 to 3 years with a maximum request of \$175,000, which includes a maximum of \$150,000 for the PEN award plus up to an additional \$25,000 as a subaward or as consultant services to the TCN for new costs to the existing network. PEN awards will adhere to the standards and processes established by the existing network. The PEN proposals should adequately indicate how the partner collection will add information to the ongoing project, fill in gaps in digitized data and increase value to the efforts for the research theme. The broader impacts should be specific for the PEN institution, but also indicate how these impacts enhance the TCN. These projects should contain most of the elements of other proposals, but the data management plan required (by the GPG) and project management plan must be developed through consultation with the existing network with an indication of how the PEN will contribute to project and data management of its own collection. To indicate that the PEN will appropriately integrate with the existing TCN, a letter of collaboration (format found under the instructions for Supplemental Documents, below) from the existing network should be uploaded in the Supplemental Documents section. It is expected that PEN proposals will utilize some of the infrastructure of the existing network, thus providing an efficient means to further the impact of the existing network. Priority will be given to proposals that improve efficiency of the digitization process. The length of a PEN proposal should be adequate to describe the activity and the integration into the existing network; a full 15 pages may not be necessary for these types of proposals.

General Items

For both TCN and PEN proposals, priority will be given to innovative projects that 1) fill gaps in the effort to provide online access to specimen data for existing biological and paleobiological collections, 2) integrate with other ongoing digitization activities and 3) increase the efficiency and lower the cost of digitization.

Both TCN and PEN proposals should include:

- a detailed management plan for accomplishing the project,
- training plan for participants and students,
- priorities for tasks,
- task analysis,
- a plan for sustaining the data and for TCN proposals, a plan for sustaining the network beyond the life of the award, and
- plans for interacting and integrating with iDigBio.

While many of these networks will be collaborative proposals, some may be from single institutions partnering with smaller collections to integrate those collections into the national resource. In all proposals, a gap analysis should be included to indicate how the proposed digitization of data contributes to increasing the accessibility of data on existing biological and paleobiological collections and the importance of these data for the research theme. The ADBC program recognizes the growing workforce needs for collection digitization and associated outreach activities. Proposals should include education and outreach components for training the next generation of collection-based researchers and educators, to be coordinated with [iDigBio](#).

III. AWARD INFORMATION

Anticipated Type of Award: Standard Grant or Continuing Grant

Estimated Number of Awards: 4 to 12

Anticipated Funding Amount: approximately \$10,000,000 total amount available across all awards in this program for FY2016, pending availability of funds.

IV. ELIGIBILITY INFORMATION

Who May Submit Proposals:

Proposals may only be submitted by the following:

- Universities and Colleges - Universities and two- and four-year colleges (including community colleges) accredited in, and having a campus located in, the US acting on behalf of their faculty members. Such organizations also are referred to as academic institutions.
- Non-profit, non-academic organizations: Independent museums, observatories, research labs, professional societies and similar organizations in the U.S. associated with educational or research activities.
- State and Local Governments: State educational offices or organizations and local school districts.

Who May Serve as PI:

There are no restrictions or limits.

Limit on Number of Proposals per Organization: 1

Only one Thematic Collections Networks (TCN) proposal may be submitted by any one organization as the lead organization. Organizations may be involved in more than one collaborative effort as a non-lead proposal.

Limit on Number of Proposals per PI or Co-PI: 1

An individual may appear as PI or co-PI on no more than one ADBC proposal submitted to any annual ADBC competition.

Additional Eligibility Info:

It is expected that TCN projects will be collaborative efforts among several institutions. Please refer to Chapter II.D.5 of the Grant Proposal Guide for guidance about the submission of collaborative proposals.

Federally-owned collections are excluded from this solicitation. Partnerships with federal agencies are encouraged.

Eligibility criteria also apply to all subawards, i.e., organizations ineligible to submit to this program may not receive subawards.

V. PROPOSAL PREPARATION AND SUBMISSION INSTRUCTIONS

A. Proposal Preparation Instructions

Full Proposal Preparation Instructions: Proposers may opt to submit proposals in response to this Program Solicitation via Grants.gov or via the NSF FastLane system.

- Full proposals submitted via FastLane: Proposals submitted in response to this program solicitation should be prepared and submitted in accordance with the general guidelines contained in the NSF Grant Proposal Guide (GPG). The complete text of the GPG is available electronically on the NSF website at: http://www.nsf.gov/publications/pub_summ.jsp?ods_key=gpg. Paper copies of the GPG may be obtained from the NSF Publications Clearinghouse, telephone (703) 292-7827 or by e-mail from nsfpubs@nsf.gov. Proposers are reminded to identify this program solicitation number in the program solicitation block on the NSF Cover Sheet For Proposal to the National Science Foundation. Compliance with this requirement is critical to determining the relevant proposal processing guidelines. Failure to submit this information may delay processing.
- Full proposals submitted via Grants.gov: Proposals submitted in response to this program solicitation via Grants.gov should be prepared and submitted in accordance with the NSF Grants.gov Application Guide: A Guide for the Preparation and Submission of NSF Applications via Grants.gov. The complete text of the NSF Grants.gov Application Guide is available on the Grants.gov website and on the NSF website at: (http://www.nsf.gov/publications/pub_summ.jsp?ods_key=grantsgovguide). To obtain copies of the Application Guide and Application Forms Package, click on the Apply tab on the Grants.gov site, then click on the Apply Step 1: Download a Grant Application Package and Application Instructions link and enter the funding opportunity number, (the program solicitation number without the NSF prefix) and press the Download Package button. Paper copies of the Grants.gov Application Guide also may be obtained from the NSF Publications Clearinghouse, telephone (703) 292-7827 or by e-mail from nsfpubs@nsf.gov.

In determining which method to utilize in the electronic preparation and submission of the proposal, please note the following:

Collaborative Proposals. All collaborative proposals submitted as separate submissions from multiple organizations must be submitted via the NSF FastLane system. Chapter II, Section D.5 of the Grant Proposal Guide provides additional information on collaborative proposals.

See Chapter II.C.2 of the [GPG](#) for guidance on the required sections of a full research proposal submitted to NSF. Please note that the proposal preparation instructions provided in this program solicitation may deviate from the GPG instructions.

The following instructions supplement those found in the GPG and NSF Grants.gov Application Guide.

Required Information for proposals:

Titles of Proposals: Titles of proposals should begin with "Digitization TCN:" or "Digitization PEN:" followed by the substantive title.

Project Summary: Note that proposals must include an overview statement of the project and address separately both of the merit review criteria approved by the National Science Board: what is the intellectual merit of the proposed activity and what are the broader impacts of the proposed activity.

Proposals that do not include the overview, intellectual merit and broader impacts sections in the project summary will not be accepted.

Project Description: In addition to the points noted in the program description above, the project description must also address the following:

How the project will integrate newly digitized collections data with established standards and existing databases and the information gaps filled by the proposed project.

- Plan for assessment and evaluation and for the TCN proposals a plan to sustain the network in the future, if it is warranted.
- Detailed project management plan, including plans for integration with iDigBio.
- How training is integrated into the project.
- Plan to track use of the data produced by the project and integration of the project into the national resource.
- Results from Prior NSF Support. If any PI or co-PI on the project has received NSF funding in the past five years, information on prior award(s) is required. Each PI and co-PI who has received more than one prior award (excluding amendments) must report on the award most closely related to the proposal. The information required is described in the GPG. Reviewers will be asked to comment on the quality of the prior work described in this section of the proposal. Please note that the proposal may devote up to five pages to describe the results, within the maximum 15 pages of Project Description. Results may be summarized in fewer than five pages, which would leave the balance of the 15 pages for the Project Description.

Proposal Budget: Budgets for TCN proposals should reflect the scope of work proposed and should not exceed four years in duration. Budgets for PEN proposals may be up to \$175,000 and may be from 2 to 3 years in duration. The budget justification for both TCN and PEN proposals should include an estimate of the cost per specimen for digitization. PEN proposals must include in their budget the costs of travel to PI meetings of the existing network and travel to iDigBio ONCE during the first year of the project.

Applicants must complete the Proposal Classification Form. The Proposal Classification Form is required for all submissions to BIO; FastLane will not allow processing of the proposal without it.

Special Information and Supplementary Documentation: Only the supplemental documents listed below are allowed for this solicitation.

- **List of Participants.** List each participating institution, and each participant (faculty level or equivalent), by full name, and indicate his or her institutional and departmental affiliation. Names should be grouped by institution, and listed alphabetically within each group.
- **Postdoc Mentoring Plan.** Each project that requests funding to support postdoctoral researchers must include, as a supplementary document, a description of the mentoring activities that will be provided for such individuals. This plan should indicate training activities for both informatics and collections issues. The mentoring plan must not exceed one page and only one plan may be submitted for collaborative projects and all postdocs must be covered by this single one-page document. Different institutions on the same project may not submit different mentoring plans.
- **Data Management Plan.** A separate data management plan (DMP) limited to two pages is required for all proposals submitted to NSF. The DMP should include specific details of data standards, accessibility, electronic dissemination, and sustainability. For guidance, see <http://www.nsf.gov/bio/pubs/BIODMP061511.pdf>. In addition to the basic BIO requirements for a DMP, ADBC proposals should provide a clear statement of how the project will manage data, software tools and other digital resources that result from the activities supported by the NSF award. The potential for re-use and adoption of these resources as sustainable cyberinfrastructure to other digitization projects, resource providers, and communities of use should also be addressed. The DMP should address long-term archiving, intellectual property rights and means of dissemination. A strategy should be outlined that will support sustainable engagement of cyberinfrastructure resources for data storage, maintenance, and access. Proposals should also include plans and contingencies for adoption of standards, best practices, interoperability and needed infrastructure. The plan should clearly detail integration of these activities with the national resource (iDigBio).
- **Integrated summary budget (for collaborative proposals only):** Organize a summary budget by the tasks to be accomplished under all collaborative proposals and the total amount devoted to each task (including all subawards). Cost per specimen for the digitization should be included.
- **Form for letter of collaboration for PEN proposals ONLY, signed by the TCN lead PI.**

To: ADBC Program Director

By signing below, as principal investigator of an ongoing digitization project, I acknowledge the appropriateness of the collections to be digitized as indicated in the proposal, entitled "PEN: Digitization: _____" with "_____ " as the Principal Investigator to become part of the ongoing digitization project entitled "TCN: Digitization: _____". The appropriate resources and activities will be made available to this new partner in the network and the budget items in the proposal have been reviewed for fit with the ongoing project.

Signed: _____

Print Name: _____

Date: _____ Institution: _____

Single Copy Documents:

Integrated Conflicts of Interests List for Applicants: Provide a list, in a single alphabetized table or spreadsheet of the full names and institutional affiliations of all people with **conflicts of interest** for the PI, any senior personnel, and any named personnel whose salary is requested in the project budget. The table should specify the nature of the conflict including: (1) PhD thesis advisors or advisees; (2) collaborator or co-authors, including postdocs, for the past 48 months; and (3) any other individuals or institutions with which the PI or Co-PIs have financial ties.

For example: a table with the name of the conflict and the institution where that person works, the name(s) of the person(s) on the proposal who has the conflict, and the nature of the conflict (i.e. major advisor, collaborator, grant support). The table should be alphabetized by the name of the conflicts, not by the names of the personnel on the proposal.

B. Budgetary Information

Cost Sharing: Inclusion of voluntary committed cost sharing is prohibited

Other Budgetary Limitations:

Partners to Existing Networks (PEN) proposals may request up to \$175,000 for a maximum of 3 years.

C. Due Dates

- **Full Proposal Deadline(s)** (due by 5 p.m. proposer's local time):

October 09, 2015

Second Friday in October, Annually Thereafter

D. FastLane/Grants.gov Requirements

For Proposals Submitted Via FastLane:

To prepare and submit a proposal via FastLane, see detailed technical instructions available at: <https://www.fastlane.nsf.gov/a1/newstan.htm>. For FastLane user support, call the FastLane Help Desk at 1-800-673-6188 or e-mail fastlane@nsf.gov. The FastLane Help Desk answers general technical questions related to the use of the FastLane system. Specific questions related to this program solicitation should be referred to the NSF program staff contact(s) listed in Section VIII of this funding opportunity.

For Proposals Submitted Via Grants.gov:

Before using Grants.gov for the first time, each organization must register to create an institutional profile. Once registered, the applicant's organization can then apply for any federal grant on the Grants.gov website. Comprehensive information about using Grants.gov is available on the Grants.gov Applicant Resources webpage: <http://www.grants.gov/web/grants/applicants.html>. In addition, the NSF Grants.gov Application Guide (see link in Section V.A) provides instructions regarding the technical preparation of proposals via Grants.gov. For Grants.gov user support, contact the Grants.gov Contact Center at 1-800-518-4726 or by email: support@grants.gov. The Grants.gov Contact Center answers general technical questions related to the use of Grants.gov. Specific questions related to this program solicitation should be referred to the NSF program staff contact(s) listed in Section VIII of this solicitation.

Submitting the Proposal: Once all documents have been completed, the Authorized Organizational Representative (AOR) must submit the application to Grants.gov and verify the desired funding opportunity and agency to which the application is submitted. The AOR must then sign and submit the application to Grants.gov. The completed application will be transferred to the NSF FastLane system for further processing.

Proposers that submitted via FastLane are strongly encouraged to use FastLane to verify the status of their submission to NSF. For proposers that submitted via Grants.gov, until an application has been received and validated by NSF, the Authorized Organizational Representative may check the status of an application on Grants.gov. After proposers have received an e-mail notification from NSF, Research.gov should be used to check the status of an application.

VI. NSF PROPOSAL PROCESSING AND REVIEW PROCEDURES

Proposals received by NSF are assigned to the appropriate NSF program for acknowledgement and, if they meet NSF requirements, for review. All proposals are carefully reviewed by a scientist, engineer, or educator serving as an NSF Program Officer, and usually by three to ten other persons outside NSF either as *ad hoc* reviewers, panelists, or both, who are experts in the particular fields represented by the proposal. These reviewers are selected by Program Officers charged with oversight of the review process. Proposers are invited to suggest names of persons they believe are especially well qualified to review the proposal and/or persons they would prefer not review the proposal. These suggestions may serve as one source in the reviewer selection process at the Program Officer's discretion. Submission of such names, however, is optional. Care is taken to ensure that reviewers have no conflicts of interest with the proposal. In addition, Program Officers may obtain comments from site visits before recommending final action on proposals. Senior NSF staff further review recommendations for awards. A flowchart that depicts the entire NSF proposal and award process (and associated timeline) is included in the GPG as [Exhibit III-1](#).

A comprehensive description of the Foundation's merit review process is available on the NSF website at: http://nsf.gov/bfa/dias/policy/merit_review/.

Proposers should also be aware of core strategies that are essential to the fulfillment of NSF's mission, as articulated in [Investing in Science, Engineering, and Education for the Nation's Future: NSF Strategic Plan for 2014-2018](#). These strategies are integrated in the program planning and implementation process, of which proposal review is one part. NSF's mission is particularly well-implemented through the integration of research and education and broadening participation in NSF programs, projects, and activities.

One of the strategic objectives in support of NSF's mission is to foster integration of research and education through the programs, projects, and activities it supports at academic and research institutions. These institutions must recruit, train, and prepare a diverse STEM workforce to advance the frontiers of science and participate in the U.S. technology-based economy. NSF's contribution to the national innovation ecosystem is to provide cutting-edge research under the guidance of the Nation's most creative scientists and engineers. NSF also supports development of a strong science, technology, engineering, and mathematics (STEM) workforce by investing in building the knowledge that informs improvements in STEM teaching and learning.

NSF's mission calls for the broadening of opportunities and expanding participation of groups, institutions, and geographic regions that are underrepresented in STEM disciplines, which is essential to the health and vitality of science and engineering. NSF is committed to this principle of diversity and deems it central to the programs, projects, and activities it considers and supports.

A. Merit Review Principles and Criteria

The National Science Foundation strives to invest in a robust and diverse portfolio of projects that creates new knowledge and enables breakthroughs in understanding across all areas of science and engineering research and education. To identify which projects to

support, NSF relies on a merit review process that incorporates consideration of both the technical aspects of a proposed project and its potential to contribute more broadly to advancing NSF's mission "to promote the progress of science; to advance the national health, prosperity, and welfare; to secure the national defense; and for other purposes." NSF makes every effort to conduct a fair, competitive, transparent merit review process for the selection of projects.

1. Merit Review Principles

These principles are to be given due diligence by PIs and organizations when preparing proposals and managing projects, by reviewers when reading and evaluating proposals, and by NSF program staff when determining whether or not to recommend proposals for funding and while overseeing awards. Given that NSF is the primary federal agency charged with nurturing and supporting excellence in basic research and education, the following three principles apply:

- All NSF projects should be of the highest quality and have the potential to advance, if not transform, the frontiers of knowledge.
- NSF projects, in the aggregate, should contribute more broadly to achieving societal goals. These "Broader Impacts" may be accomplished through the research itself, through activities that are directly related to specific research projects, or through activities that are supported by, but are complementary to, the project. The project activities may be based on previously established and/or innovative methods and approaches, but in either case must be well justified.
- Meaningful assessment and evaluation of NSF funded projects should be based on appropriate metrics, keeping in mind the likely correlation between the effect of broader impacts and the resources provided to implement projects. If the size of the activity is limited, evaluation of that activity in isolation is not likely to be meaningful. Thus, assessing the effectiveness of these activities may best be done at a higher, more aggregated, level than the individual project.

With respect to the third principle, even if assessment of Broader Impacts outcomes for particular projects is done at an aggregated level, PIs are expected to be accountable for carrying out the activities described in the funded project. Thus, individual projects should include clearly stated goals, specific descriptions of the activities that the PI intends to do, and a plan in place to document the outputs of those activities.

These three merit review principles provide the basis for the merit review criteria, as well as a context within which the users of the criteria can better understand their intent.

2. Merit Review Criteria

All NSF proposals are evaluated through use of the two National Science Board approved merit review criteria. In some instances, however, NSF will employ additional criteria as required to highlight the specific objectives of certain programs and activities.

The two merit review criteria are listed below. **Both** criteria are to be given **full consideration** during the review and decision-making processes; each criterion is necessary but neither, by itself, is sufficient. Therefore, proposers must fully address both criteria. ([GPG Chapter II.C.2.d.i.](#) contains additional information for use by proposers in development of the Project Description section of the proposal.) Reviewers are strongly encouraged to review the criteria, including [GPG Chapter II.C.2.d.i.](#), prior to the review of a proposal.

When evaluating NSF proposals, reviewers will be asked to consider what the proposers want to do, why they want to do it, how they plan to do it, how they will know if they succeed, and what benefits could accrue if the project is successful. These issues apply both to the technical aspects of the proposal and the way in which the project may make broader contributions. To that end, reviewers will be asked to evaluate all proposals against two criteria:

- **Intellectual Merit:** The Intellectual Merit criterion encompasses the potential to advance knowledge; and
- **Broader Impacts:** The Broader Impacts criterion encompasses the potential to benefit society and contribute to the achievement of specific, desired societal outcomes.

The following elements should be considered in the review for both criteria:

1. What is the potential for the proposed activity to
 - a. Advance knowledge and understanding within its own field or across different fields (Intellectual Merit); and
 - b. Benefit society or advance desired societal outcomes (Broader Impacts)?
2. To what extent do the proposed activities suggest and explore creative, original, or potentially transformative concepts?
3. Is the plan for carrying out the proposed activities well-reasoned, well-organized, and based on a sound rationale? Does the plan incorporate a mechanism to assess success?
4. How well qualified is the individual, team, or organization to conduct the proposed activities?
5. Are there adequate resources available to the PI (either at the home organization or through collaborations) to carry out the proposed activities?

Broader impacts may be accomplished through the research itself, through the activities that are directly related to specific research projects, or through activities that are supported by, but are complementary to, the project. NSF values the advancement of scientific knowledge and activities that contribute to achievement of societally relevant outcomes. Such outcomes include, but are not limited to: full participation of women, persons with disabilities, and underrepresented minorities in science, technology, engineering, and mathematics (STEM); improved STEM education and educator development at any level; increased public scientific literacy and public engagement with science and technology; improved well-being of individuals in society; development of a diverse, globally competitive STEM workforce; increased partnerships between academia, industry, and others; improved national security; increased economic competitiveness of the United States; and enhanced infrastructure for research and education.

Proposers are reminded that reviewers will also be asked to review the Data Management Plan and the Postdoctoral Researcher Mentoring Plan, as appropriate.

Additional Solicitation Specific Review Criteria

For TCN proposals the following items will be important, as well as the items in the project description:

- data sustainability and sustainability plans for the network itself
- efficiency of digitization
- integration of pertinent collections
- lack of overlap with other efforts
- importance of the collections to be digitized to the research theme
- integration of the project with the national resource (iDigBio)

For PEN proposals the following criteria will be important:

- integration and enhancement of all parts of the existing network by this project
- importance of the data for filling a gap in the existing network

- data sustainability
- efficiency of digitization

B. Review and Selection Process

Proposals submitted in response to this program solicitation will be reviewed by Ad hoc Review and/or Panel Review.

Reviewers will be asked to evaluate proposals using two National Science Board approved merit review criteria and, if applicable, additional program specific criteria. A summary rating and accompanying narrative will be completed and submitted by each reviewer. The Program Officer assigned to manage the proposal's review will consider the advice of reviewers and will formulate a recommendation.

After scientific, technical and programmatic review and consideration of appropriate factors, the NSF Program Officer recommends to the cognizant Division Director whether the proposal should be declined or recommended for award. NSF strives to be able to tell applicants whether their proposals have been declined or recommended for funding within six months. Large or particularly complex proposals or proposals from new awardees may require additional review and processing time. The time interval begins on the deadline or target date, or receipt date, whichever is later. The interval ends when the Division Director acts upon the Program Officer's recommendation.

After programmatic approval has been obtained, the proposals recommended for funding will be forwarded to the Division of Grants and Agreements for review of business, financial, and policy implications. After an administrative review has occurred, Grants and Agreements Officers perform the processing and issuance of a grant or other agreement. Proposers are cautioned that only a Grants and Agreements Officer may make commitments, obligations or awards on behalf of NSF or authorize the expenditure of funds. No commitment on the part of NSF should be inferred from technical or budgetary discussions with a NSF Program Officer. A Principal Investigator or organization that makes financial or personnel commitments in the absence of a grant or cooperative agreement signed by the NSF Grants and Agreements Officer does so at their own risk.

Once an award or declination decision has been made, Principal Investigators are provided feedback about their proposals. In all cases, reviews are treated as confidential documents. Verbatim copies of reviews, excluding the names of the reviewers or any reviewer-identifying information, are sent to the Principal Investigator/Project Director by the Program Officer. In addition, the proposer will receive an explanation of the decision to award or decline funding.

VII. AWARD ADMINISTRATION INFORMATION

A. Notification of the Award

Notification of the award is made to *the submitting organization* by a Grants Officer in the Division of Grants and Agreements. Organizations whose proposals are declined will be advised as promptly as possible by the cognizant NSF Program administering the program. Verbatim copies of reviews, not including the identity of the reviewer, will be provided automatically to the Principal Investigator. (See Section VI.B. for additional information on the review process.)

B. Award Conditions

An NSF award consists of: (1) the award notice, which includes any special provisions applicable to the award and any numbered amendments thereto; (2) the budget, which indicates the amounts, by categories of expense, on which NSF has based its support (or otherwise communicates any specific approvals or disapprovals of proposed expenditures); (3) the proposal referenced in the award notice; (4) the applicable award conditions, such as Grant General Conditions (GC-1)*; or Research Terms and Conditions* and (5) any announcement or other NSF issuance that may be incorporated by reference in the award notice. Cooperative agreements also are administered in accordance with NSF Cooperative Agreement Financial and Administrative Terms and Conditions (CA-FATC) and the applicable Programmatic Terms and Conditions. NSF awards are electronically signed by an NSF Grants and Agreements Officer and transmitted electronically to the organization via e-mail.

*These documents may be accessed electronically on NSF's Website at http://www.nsf.gov/awards/managing/award_conditions.jsp?org=NSF. Paper copies may be obtained from the NSF Publications Clearinghouse, telephone (703) 292-7827 or by e-mail from nsfpubs@nsf.gov.

More comprehensive information on NSF Award Conditions and other important information on the administration of NSF awards is contained in the NSF *Award & Administration Guide* (AAG) Chapter II, available electronically on the NSF Website at http://www.nsf.gov/publications/pub_summ.jsp?ods_key=aag.

C. Reporting Requirements

For all multi-year grants (including both standard and continuing grants), the Principal Investigator must submit an annual project report to the cognizant Program Officer at least 90 days prior to the end of the current budget period. (Some programs or awards require submission of more frequent project reports). Within 90 days following expiration of a grant, the PI also is required to submit a final project report, and a project outcomes report for the general public.

Failure to provide the required annual or final project reports, or the project outcomes report, will delay NSF review and processing of any future funding increments as well as any pending proposals for all identified PIs and co-PIs on a given award. PIs should examine the formats of the required reports in advance to assure availability of required data.

PIs are required to use NSF's electronic project-reporting system, available through Research.gov, for preparation and submission of annual and final project reports. Such reports provide information on accomplishments, project participants (individual and organizational), publications, and other specific products and impacts of the project. Submission of the report via Research.gov constitutes certification by the PI that the contents of the report are accurate and complete. The project outcomes report also must be prepared and submitted using Research.gov. This report serves as a brief summary, prepared specifically for the public, of the nature and outcomes of the project. This report will be posted on the NSF website exactly as it is submitted by the PI.

More comprehensive information on NSF Reporting Requirements and other important information on the administration of NSF awards is contained in the *NSF Award & Administration Guide* (AAG) Chapter II, available electronically on the NSF Website at http://www.nsf.gov/publications/pub_summ.jsp?ods_key=aag.

The TCN awards may be collaborative projects, and in those cases the annual reports should be an integrated report from all partners which is submitted by the lead in the TCN and each collaborator should submit a report indicating what their individual contribution has been to the network, attaching a pdf of the lead integrated report. In addition, all TCN reports should include statements from iDigBio indicating that the data are now a part of the national resource and adding such information about the utilization of the data and conformity to the standards for integration of the data. During the first year of the award, TCNs will report to iDigBio at months 4 and 8 in order to initiate proper integration of data. PENs will join existing networks and report to iDigBio through the existing network reports; however, PENs will need to submit separate annual reports to NSF. These reports should include a statement indicating how the PEN has enhanced the existing TCN for intellectual merit, broader impacts and digitization activities.

VIII. AGENCY CONTACTS

Please note that the program contact information is current at the time of publishing. See program website for any updates to the points of contact.

General inquiries regarding this program should be made to:

- Anne M. Maglia, Program Director, telephone: (703) 292-8470, email: biodigit@nsf.gov
- H. Richard Lane, Program Director, telephone: 703-292-4730, email: biodigit@nsf.gov
- Roland P. Roberts, telephone: (703) 292-8470, email: biodigit@nsf.gov

For questions related to the use of FastLane, contact:

- FastLane Help Desk, telephone: 1-800-673-6188; e-mail: fastlane@nsf.gov.

For questions relating to Grants.gov contact:

- Grants.gov Contact Center: If the Authorized Organizational Representatives (AOR) has not received a confirmation message from Grants.gov within 48 hours of submission of application, please contact via telephone: 1-800-518-4726; e-mail: support@grants.gov.

Contacting the program may be most efficient through e-mail to the working group at BIODigit@nsf.gov

IX. OTHER INFORMATION

The NSF website provides the most comprehensive source of information on NSF Directorates (including contact information), programs and funding opportunities. Use of this website by potential proposers is strongly encouraged. In addition, "NSF Update" is an information-delivery system designed to keep potential proposers and other interested parties apprised of new NSF funding opportunities and publications, important changes in proposal and award policies and procedures, and upcoming NSF [Grants Conferences](#). Subscribers are informed through e-mail or the user's Web browser each time new publications are issued that match their identified interests. "NSF Update" also is available on NSF's website at https://public.govdelivery.com/accounts/USNSF/subscriber/new?topic_id=USNSF_179.

Grants.gov provides an additional electronic capability to search for Federal government-wide grant opportunities. NSF funding opportunities may be accessed via this mechanism. Further information on Grants.gov may be obtained at <http://www.grants.gov>.

Related Programs:

Related programs are the Collections in Support of Biological Research and Advances in Biological Informatics, Dimensions of Biodiversity, Systematic Biology Program, and Sedimentary Geology and Paleobiology Program.

ABOUT THE NATIONAL SCIENCE FOUNDATION

The National Science Foundation (NSF) is an independent Federal agency created by the National Science Foundation Act of 1950, as amended (42 USC 1861-75). The Act states the purpose of the NSF is "to promote the progress of science; [and] to advance the national health, prosperity, and welfare by supporting research and education in all fields of science and engineering."

NSF funds research and education in most fields of science and engineering. It does this through grants and cooperative agreements to more than 2,000 colleges, universities, K-12 school systems, businesses, informal science organizations and other research organizations throughout the US. The Foundation accounts for about one-fourth of Federal support to academic institutions for basic research.

NSF receives approximately 55,000 proposals each year for research, education and training projects, of which approximately 11,000 are funded. In addition, the Foundation receives several thousand applications for graduate and postdoctoral fellowships. The agency operates no laboratories itself but does support National Research Centers, user facilities, certain oceanographic vessels and Arctic and Antarctic research stations. The Foundation also supports cooperative research between universities and industry, US participation in international scientific and engineering efforts, and educational activities at every academic level.

Facilitation Awards for Scientists and Engineers with Disabilities provide funding for special assistance or equipment to enable persons with disabilities to work on NSF-supported projects. See Grant Proposal Guide Chapter II, Section D.2 for instructions regarding

preparation of these types of proposals.

The National Science Foundation has Telephonic Device for the Deaf (TDD) and Federal Information Relay Service (FIRS) capabilities that enable individuals with hearing impairments to communicate with the Foundation about NSF programs, employment or general information. TDD may be accessed at (703) 292-5090 and (800) 281-8749, FIRS at (800) 877-8339.

The National Science Foundation Information Center may be reached at (703) 292-5111.

The National Science Foundation promotes and advances scientific progress in the United States by competitively awarding grants and cooperative agreements for research and education in the sciences, mathematics, and engineering.

To get the latest information about program deadlines, to download copies of NSF publications, and to access abstracts of awards, visit the NSF Website at <http://www.nsf.gov>

- **Location:** 4201 Wilson Blvd. Arlington, VA 22230
- **For General Information** (NSF Information Center): (703) 292-5111
- **TDD (for the hearing-impaired):** (703) 292-5090
- **To Order Publications or Forms:**
 - Send an e-mail to: nsfpubs@nsf.gov
 - or telephone: (703) 292-7827
- **To Locate NSF Employees:** (703) 292-5111

PRIVACY ACT AND PUBLIC BURDEN STATEMENTS

The information requested on proposal forms and project reports is solicited under the authority of the National Science Foundation Act of 1950, as amended. The information on proposal forms will be used in connection with the selection of qualified proposals; and project reports submitted by awardees will be used for program evaluation and reporting within the Executive Branch and to Congress. The information requested may be disclosed to qualified reviewers and staff assistants as part of the proposal review process; to proposer institutions/grantees to provide or obtain data regarding the proposal review process, award decisions, or the administration of awards; to government contractors, experts, volunteers and researchers and educators as necessary to complete assigned work; to other government agencies or other entities needing information regarding applicants or nominees as part of a joint application review process, or in order to coordinate programs or policy; and to another Federal agency, court, or party in a court or Federal administrative proceeding if the government is a party. Information about Principal Investigators may be added to the Reviewer file and used to select potential candidates to serve as peer reviewers or advisory committee members. See Systems of Records, [NSF-50](#), "Principal Investigator/Proposal File and Associated Records," 69 Federal Register 26410 (May 12, 2004), and [NSF-51](#), "Reviewer/Proposal File and Associated Records," 69 Federal Register 26410 (May 12, 2004). Submission of the information is voluntary. Failure to provide full and complete information, however, may reduce the possibility of receiving an award.

An agency may not conduct or sponsor, and a person is not required to respond to, an information collection unless it displays a valid Office of Management and Budget (OMB) control number. The OMB control number for this collection is 3145-0058. Public reporting burden for this collection of information is estimated to average 120 hours per response, including the time for reviewing instructions. Send comments regarding the burden estimate and any other aspect of this collection of information, including suggestions for reducing this burden, to:

Suzanne H. Plimpton
Reports Clearance Officer
Office of the General Counsel
National Science Foundation
Arlington, VA 22230

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